

REMARKS

Claims 2-19, 21, and 23-25 are currently pending in this application. Pursuant to the October 10, 2007 Office Action, claims 1-19, 21, and 23-25 were rejected. The Office Action further required cancellation of non-elected claim 22.

This Reply is being filed to supplement the claim amendments and arguments set forth in the Reply filed with the Request for Continued Examination (RCE) filed on October 31, 2007. Pursuant to the October 31, 2007 Reply, independent claim 22 was cancelled. Independent claim 24 was amended in a manner that is believed to overcome the written description rejection and to recite that the microscope is arranged “to form an image corresponding to variations of the measured parameter along each scan line.” Support for this amendment can be found at the paragraph at pg. 3, line 14 – pg. 4, line 1 of the specification. Independent claim 25 was amended to recite that the microscope is arranged “to carry out a raster scan of the sample surface” and that “each scan line being a component of the raster scan.” Support for this amendment can be found in the specification at pg. 10, line 8 – pg. 11, line 2; pg. 16, lines 19-22; and pg. 20, line 28 – pg. 21, line 1.

By way of the current Supplemental Reply, independent claim 1 has been cancelled. Independent claims 21 and 23 have been amended, without prejudice, in a similar manner as the October 31, 2007 amendment to independent claim 24. Independent claim 25 has been amended to further clarify that each scan line is collected by “oscillating either the probe (20) or the sample laterally ...” Dependent

claims 2, 3, 6, 7, 9, 12, 14, and 16 have been amended to depend from claim 24. Applicants submit that no new matter has been introduced into the application by way of these amendments.

Claim Rejections – 35 U.S.C. § 112, first paragraph

Claim 24 has been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Office Action states that “it is unclear where Applicant originally discloses ‘to form an image corresponding to variations of the measured parameter along each scan line.’” In Applicant’s October 31, 2007 response, this phrase was deleted from claim 24, and the phrase “wherein the microscope is further arranged to form an image corresponding to variations of the measured parameter during each oscillation” was added to claim 24.

Support for the amendment to claim 24 can be found at the paragraph at pg. 3, line 14 – pg. 4, line 1 of the specification. In particular, the penultimate sentence of this paragraph states “variations in the measured parameter within the timescale of an oscillation therefore constitute the ‘interaction’ image, and are interpreted as arising from true surface features.” The second sentence of the same paragraph states “each scan line is collected as a continuous (analogue) image as either the probe oscillates across the surface of the sample or the sample oscillates beneath the probe.” The final sentence of this paragraph states “this provides a far more rapid technique with which to collect interaction image information.”

Thus, it should be clear that the invention relates to a microscope arranged to collect interaction image information, the interaction image being derived from variations in the measured parameter during each oscillation. Withdrawal of the written description rejection of claim 24 is respectfully requested.

Claim Rejections – 35 U.S.C. § 102(b)

Claims 21 and 23 remain rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,254,854 (Betzig). Applicants respectfully traverse these rejections for the reasons set forth in detail below.

Claims 21 and 23, as amended, recite that the microscope is arranged “to form an image corresponding to variations of the measured parameter during each oscillation.” The dither line 160 in Betzig is the only component of its scan that is collected at resonance. This dither line is not used to form an image corresponding to variations in a parameter during each oscillation. Rather, the dither motion 160 is “used for shear-force sensing.” Betzig at col. 5, lines 49 – 50. This is based on the fact that the “if the probe is oscillated at a frequency which is near resonance, shear forces will shift the resonance either closer to, or further from, the driving frequency. As a result, the oscillatory amplitude of the probe tip will increase or decrease, respectively.” Betzig at col. 3, lines 27 – 31. Thus, it is clear that the amplitude of probe oscillation is monitored in Betzig. It is not possible for this to vary or for any variations to be monitored during an oscillation. In Betzig, the probe must complete at least one sweep (or dither line) before amplitude can be determined. Therefore it is impossible to measure variations in this parameter

along the dither line, and the dither line cannot accordingly be a line along which the sample is imaged.

Independent claims 21 and 23 are distinguishable from Betzig and withdrawal of the anticipation rejections of these claims is respectfully requested.

Claim Rejections – 35 U.S.C. § 103(a)

1. Betzig in view of Elings et al.

Claims 1, 3, 12-18, 24, and 25 remain rejected under 35 U.S.C. § 103(a) as being obvious over Betzig in view of U.S. Patent No. 6,008,489 (Elings et al.). Applicants respectfully traverse these rejections for the reasons set forth in detail below.

By way of this Reply, claim 1 has been cancelled, and the rejection of this claim is moot. Claim 24, as amended pursuant to Applicants' October 31, 2007 Reply, recites, in part, "the microscope is further arranged to form an image corresponding to variations of the measured parameter during each oscillation." Claim 24 is distinguishable from Betzig for the same reasons set forth above with respect to claims 21 and 23. Furthermore, Elings does not resolve the above-noted shortcomings of Betzig.

Furthermore, paragraph 7 of the October 10, 2007 Office Action that "since shear force imaging generates an image, an image is formed corresponding to variations of the measured parameter (shear force measurement) along each scan line." Applicants respectfully submit that this statement is incorrect because the shear force measurement is not part of the image, but is used to maintain the

height of the probe above the sample. Even accepting the incorrect premise that the shear force measurement may be used to form an image, this image must correspond to a single sample point (shear force) per resonant oscillation. The image is not formed from variations during a resonant oscillation. While the image may arguably be formed from multiple shear force measurements taken at different positions along the non-resonant raster scan lines 170 of Betzig; these lines 170 do not correspond to the claimed (resonant) scan lines of the present invention.

Independent claims 25, as amended pursuant to Applicants' October 31, 2007 Reply, recites that the microscope carries out a raster scan of the sample surface, wherein each scan line (collected at resonance) is a component of the raster scan. Paragraph 7 of the Office Action states, "since the raster scan in Betzig is further dithered, each scan line is a 'component' of the raster scan." By way of the October 31, 2007 Reply and current Reply, claim 25 was amended to recite that the scan lines (resulting from a resonant oscillation, according to the present invention) are components of a raster scan that extend "across the width of the raster scan area" and are "collected by oscillating either the probe or the sample laterally at or near its resonant frequency." Support for the amendment to claim 25 can be found in the specification in at least the paragraphs at pg. 10, lines 8-21 ("a raster scan of the surface is begun. In scanning the probe 20 over the sample 12, the first piezo 16 controls movement in a y direction. The second piezo 22 drives a near-resonant oscillation of the probe about the z axis in the xz plane. Probe oscillation is with a relatively large amplitude, of the order of a few microns."); pg. 10, line 22 – pg. 11,

line 2 ("Successive scan lines are collected as the probe oscillates. Each line will therefore have a length equal to twice the oscillation amplitude, this length corresponding to the maximum width of the image.")

In contrast, the dither oscillations 160 of Betzig do not extend across the width of the scan area. They are small perturbations on the larger raster scan lines 170. These lines 170 define the width of the scan area. Based on the foregoing, Applicants respectfully submit that claim 25 is distinguishable from Betzig. Furthermore, Elings does not resolve the above-noted shortcomings of Betzig.

Accordingly, withdrawal of the obviousness rejection of independent claims 24 and 25 is respectfully requested. In addition, claims 3 and 12-18, which depend from independent claim 24 are distinguishable from the cited prior art for the same reasons.

2. *Kley in view of Betzig and Elings (and Ookubo)*

Claims 1-4, 6-19, 21 and 24 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,752,008 (Kley) in view of Betzig and Elings. Claim 5 remains rejected under 35 U.S.C. § 103(a) as being unpatentable over Kley in view of Betzig and Elings and further in view of U.S. Patent No. 6,614,227 (Ookubo).

As set forth above, claims 21 and 24, as amended, recite that the microscope is arranged "to form an image corresponding to variations of the measured parameter during each oscillation." Applicants respectfully submit that neither Kley, Betzig, Elings, nor Ookubo, alone or in combination, teach or suggest forming

an image corresponding to variations in a measured parameter during resonant oscillations.

Accordingly, withdrawal of the obviousness rejection of independent claims 21 and 24 is respectfully requested. In addition, claims 2-4 and 6-19, which depend from independent claim 24 are distinguishable from the cited prior art for the same reasons.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing remarks, Applicants respectfully submit that the present application, including claims 2-19, 21, and 23-25, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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